

What have we learned from SuperK, SNO, ...?

1. $m_\nu > 0$ (but only determined Δm^2)
2. ν 's oscillate (but have not determined all mixing angles)
3. Majorana or Dirac ? (still don't know)

How to address 1 and 3 ?

Only way is $0\nu\beta\beta$ decay !

Experiment of Choice:

CUORE (Cryogenic Underground Observatory for Rare Events)

**1000-crystal array of TeO_2 bolometers cooled to 10mK
(1-ton total mass)**

measure temperature rise using NTD germanium thermistors

energy resolution better than 8 keV at 2.6 MeV

experiment will take place at Gran Sasso Underground Lab.

Why this experiment?

Fastest possible (by 2-5 years)

Least expensive (by \$40M - \$90M)

Because you don't need isotopically enriched material!

Competitive in sensitivity with all other proposed $0\nu\beta\beta$ decay experiments. ($m_\nu = 0.01 - 0.1$ eV)

Estimated cost: \$8M

Time to construct: 3 – 5 years

Running time: 5 years +

Many other experiments possible once array is built

(axions, dark matter, rare alpha, beta, gamma decays)